

1. An apparatus to accurately detect "touch" events and "release" events of a wet contact touchpad having spaced apart plates and water between the spaced apart plates comprising:

5 a. a charging circuit at a first voltage connected to the spaced apart plates so as to provide a charge to the plates of the wet contact touchpad in a first time period;

10 b. an electronic switching system to disconnect the charging system from the spaced apart plates when the charge on the plate reaches at a selected second voltage, the second voltage being lower than the first voltage, and the disconnection beginning a second time period;

15 c. a monitoring system for sensing the voltage between the spaced apart plates; and,

20 d. a signal system for detecting a selected number "n" of successive decreasing voltages between the spaced apart plates during second time periods, thereby detecting a "touch" event and issuing a "touch" signal.

2. The apparatus of claim 1, wherein the spaced apart plates are reconnected to the charging system immediately following a detected "touch" event so as to charge the spaced apart plates in preparation for detecting a "release" event.

5 3. The apparatus of claim 1, wherein the signal system detects "release" events as a selected number "n" of successive increasing voltages between the spaced apart plates during second time periods following a "touch" event and issuing a "release" signal.

10 4. The apparatus of claim 1, wherein the electronic switching system includes a microcontroller interfaced to an analog-to-digital converter (ADC) to monitor the voltage in combination with a transistor switch arrangement, wherein the microcontroller continually samples the voltage through the
15 ADC.

5. The apparatus of claim 1, wherein the second voltage is not more than about 1.3 volts.

6. The apparatus of claim 1, wherein the first voltage is about 16 volts.

20 7. The apparatus of claim 6, wherein the second voltage is about 0.25 volt.

8. The apparatus of claim 1, wherein the "release" event signal is corrected by deducting for time estimated to achieve the first increased voltage.

25 9. The apparatus of claim 1, further comprising:

- a. a timer system receiving the signals; and,
- b. a scoreboard displaying results from the timer system.

30 10. The apparatus of claim 9, wherein the timer system receives signals from a plurality of touchpads.

11. A method to accurately detect the touch and the release of a wet contact touchpad by sampling rates of decreasing or increasing voltage sampled between rapidly occurring charging cycles, the method comprising the steps of:

- 5 a. providing a wet contact touchpad, the touchpad having flexible spaced apart plates and water between the spaced apart plates;
- b. electronically connecting the touchpad plates to a charging source and charging the plates with a first
10 voltage, so as to reach a second charge voltage between the plates, the second charge voltage being less than the first voltage;
- c. electrically disconnecting the plates from the charging source when the second charged voltage is
15 reached;
- d. monitoring the voltage of the charge between the plates using an analog-to-digital convertor (ADC);
- e. using a transistor switch arrangement to control the connection and disconnection of the charging source;
20 and,
- f. detecting a "touch" when "n" number of sequential decreasing samples of the charge between the plates are detected.

12. The method of claim 10, further comprising the steps:

- 5 a. immediately connecting the charging source when a "touch" has been detected to prepare for detecting a release; and,
- b. detecting a release when sequential increasing charge voltages are detected between the plates.

13. The method of claim 12, further comprising the steps of:

- 10 a. signaling a "touch" when a "touch" is detected; and,
- b. signaling a "release" when a "release" is detected.

14. The method of claim 13, further comprising the step of calculating the corrected time of a "release" based upon the RC parameters of the touchpad and the initial charge
15 voltage observed with the "release" event.

15. A method to accurately detect the touch and the release of a wet contact touchpad by sampling rates of decreasing or increasing voltage sampled between rapidly occurring charging cycles, the method comprising the steps of:

- 5 a. connecting a charger to the plates to charge the plates;
- b. disconnecting the charger from the plates after a selected time interval;
- c. measuring the charge voltage between the plates;
- 10 d. recording the measured charge voltage;
- e. reconnecting the charger to the plates to recharge the plates;
- f. disconnecting the charger from the plates after the selected time;
- 15 g. measuring the new charge voltage between the plates;
- h. comparing the new charge voltage to the recorded charge voltage to observe an increase or decrease in measured voltage after charging;
- i. recording the increase or decrease; and,
- 20 j. detecting "n" consecutive increases or decreases so as to observe a "touch" event, wherein the "touch" event is defined as "n" consecutive decreases in charge voltage after charging and "release" is defined as "n" consecutive increases in charge
- 25 voltage after charging.

16. The method of claim 15, further comprising the step of using an estimated approximate RC time constant to subtract time to yield an estimated corrected time at which "release" occurred.